

In the Drawings

A "Replacement Sheet" is attached which includes a clean version of amended Figures 1A, 1B and 2. The attached sheet replaces the original sheets including Figures 1A, 1B and 2. Figures 1A, 1B and 2 were amended to include the legend –Prior Art–, as requested in the Office Action.

REMARKS

In response to the Office Action mailed May 17, 2005, Applicant respectfully requests reconsideration. Claims 1-9 were previously pending in this application. Claims 1, 4 and 5 have been amended. New claims 10-39 have been added. As a result, claims 1-39 are pending for examination with claims 1, 10 and 17 being independent claims. No new matter has been added.

Objections to the Drawings

The Office Action objected to the drawings because Figures 1A, 1B, and 2 did not include the legend "prior art." Figures 1A, 1B, and 2 have been amended to include the legend "prior art."

Accordingly, withdrawal of this objection is respectfully requested.

Allowable Subject Matter

Applicant notes with appreciation the indication of allowable subject matter in claim 6. However, claim 6 has not been rewritten in independent form because claim 6 depends from claim 1 which is believed to be in allowable condition.

Rejections Under 35 U.S.C. §102

The Office Action rejected claims 1-3 under 35 U.S.C. §102 as being anticipated by Anthony et al. (U.S. Patent 3,979,820) and Cline et al. (U.S. Patent 3,988,764). Applicant respectfully traverses this rejection.

Anthony et al. is directed to a lead-through recrystallized region for connecting devices on opposite sides of a substrate. A region of recrystallized semiconductor material extends through the body of the substrate. As stated in the abstract, "the recrystallized region of material is employed as an electrical means to interconnect electrical elements associated with the respective opposed major surfaces."

Fig. 1 illustrates the structure of the electrical interconnect. Recrystallized region 22 is formed between portions of the body 12. Device 18 and device 20 are disposed on opposite sides of the body 12, and are electrically connected by a recrystallized region 22 of high conductivity that extends through the body. "The region 22 forms an electrical path between the two surfaces 14 and 16." (col. 2, lines 43-44).

The body 12 and recrystallized region 22 are of opposite conductivity type, so that a P-N junction 24 is formed at the interface of the body 12 and the recrystallized region 22. The P-N junction 24 isolates the conductive portion 22 from the body 12 to prevent currents from flowing from the conductive portion 22 into the body 12. P-N junction 24 is merely used for isolation and is not an active junction (col. 2, lines 43-50).

By contrast, claim 1, as amended, recites, *inter alia*, a semiconductor component in which the active junctions extend perpendicularly to a first surface of a semiconductor chip substantially across an entire thickness thereof. Anthony et al. does not teach or suggest a semiconductor component that has an active junction. Therefore, claim 1 patentably distinguishes over Anthony et al. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 2-9 depend from claim 1 and are therefore patentable over Anthony et al. for at least the same reasons.

Cline et al. is directed to a deep diode solid state inductor coil. An inductor is formed in a body of semiconductor material by forming columnar structures (abstract). Fig. 6 illustrates that the columns of the inductor coil (regions 24) are formed of P-type conductivity semiconductor material, within a body of N-type semiconductor material. The interface between the P-type regions 24 and the N-type body 10 forms a P-N junction 26. The P-N junction 26 separates the coil of P-type semiconductor from the surrounding N-type body 10. The P-N junction 26 is merely used for isolation of the P-type conductive region, and is not an active junction (col. 5, lines 16-30).

By contrast, claim 1, as amended, recites, *inter alia*, a semiconductor component in which the active junctions extend perpendicularly to a first surface of a semiconductor chip substantially across an entire thickness thereof. Cline et al. does not teach or suggest a semiconductor component that has an active junction. Therefore, claim 1 patentably distinguishes over Cline et al. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 2-9 depend from claim 1 and are therefore patentable over Anthony et al. for at least the same reasons.

The Office Action rejected claims 4 and 5 under 35 U.S.C. §102 as being anticipated by Rouse et al. (U.S. Patent 3,128,530). Applicant respectfully traverses this rejection.

Rouse is directed to a transistor analogous in operation to a triode valve (col. 1, lines 45-46). Fig. 5 illustrates N-type regions extending into a P⁺ body. The N-type regions are contacted by a gate contact on the top side of the substrate. P-N junctions are formed that are perpendicular to the gate contact. As shown in Fig. 5, a second metallization is disposed on the left side of the P-type substrate and a third metallization is disposed on the right side of the P-type substrate.

By contrast, claim 1, as amended, recites, *inter alia*, a semiconductor component in which the active junctions extend perpendicularly to a first surface of a semiconductor chip substantially across an entire thickness thereof, wherein the semiconductor chip has a first metallization associated with the first surface and a second metallization associated with a second surface, the first and second surfaces being on opposing sides of the semiconductor chip. Rouse et al. does not teach or suggest a semiconductor component in which the active junctions extend perpendicularly to a first surface of a semiconductor chip, and wherein the first and second surfaces are on opposing sides of the semiconductor chip. Therefore, claim 1 patentably distinguishes over Rouse et al. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 2-9 depend from claim 1, and are therefore patentable for at least the same reasons.

Rejections Under 35 U.S.C. §103

The Office Action rejected claims 8 and 9 under 35 U.S.C. §103(a) as being unpatentable over Krishna (U.S. Patent 3,988,771) in view of Kobayashi (U.S. Patent 3,925,803). Applicant respectfully traverses this rejection.

Applicant respectfully disagrees that there exists motivation to combine the Krishna and Kobayashi references, however, the motivation to combine the references will not be discussed further herein. Applicant reserves the right to raise this issue at a later date.

Krishna is directed to a semiconductor device with deep level impurities. Regions of recrystallized material 36 extend through the substrate (Fig. 5 and col. 5, lines 1-2). An N-type region 18, a P-type region 16, and a P-N junction 22 extend parallel to the major surfaces 12 and 14 of the substrate (Fig. 5 and col. 2, lines 35-37).

Kobayashi is directed to an oriented polycrystal JFET. Referring to Fig. 5, there exist N-type regions and P-type regions that are perpendicular to the surface of the substrate 12 and 13. However, the P-N junctions terminate at the regions 12 and 13.

By contrast, claim 1, as amended, recites, *inter alia*, a semiconductor component in which the active junctions extend perpendicularly to a first surface of a semiconductor chip substantially across an entire thickness thereof. Neither Krishna nor Kobayashi teach or suggest a semiconductor component in which the active junctions extend perpendicularly to a first surface of a semiconductor chip substantially across an entire thickness thereof. Therefore, claim 1 patentably distinguishes over Krishna and Kobayashi either alone or in combination. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 2-9 depend from claim 1, and are therefore patentable for at least the same reasons.

New Claims

New claim 10 relates to a semiconductor component in which the active junctions extend perpendicularly to a surface of a semiconductor chip substantially across the entire thickness thereof. Contacts with regions to be connected are provided by metal fingers substantially crossing an entire region within the semiconductor chip with which a contact is desired to be established. The art of record does not teach or suggest a semiconductor component in which the active junctions extend perpendicularly to a surface of a semiconductor chip substantially across the entire thickness thereof, wherein contacts with regions to be connected are provided by metal fingers substantially crossing an entire region within the semiconductor chip with which a contact is desired to be established. Therefore claim 10 is patentable over the art of record.

Claims 11-16 depend from claim 10 and are therefore patentable for at least the same reasons.

New claim 17 relates to a semiconductor component that includes a substrate, a first region of a first conductivity type that extends through the substrate and a second region of a second conductivity type that extends through the substrate. The component also includes a p-n junction between the first region and the second region that extends through the substrate, a first contact that extends through the substrate and contacts the first region and a second contact that extends through the substrate. Claim 17 is patentable over the art of record because the art of

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record does not teach or suggest a semiconductor component with these claimed aspects.

Claims 18-39 depend from claim 17 and are therefore patentable for at least the same reasons.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,
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